ABSTRACT

A metal ring made of maraging steel is heated in the presence of a halogen compound gas, so as to eliminate an oxide film from the surface of the metal ring and to form a halogenous compound film. Thereafter, the metal ring is heated under a vacuum or reduced pressure atmosphere to eliminate the halogenous compound film, and then it is maintained under an atmosphere comprising ammonia at a processing temperature ranging between 450°C and 500°C for a processing time ranging between 30 and 120 minutes, so as to carry out a nitriding processing. The above nitriding processing comprises the steps of: placing the above metal ring into a heating furnace and raising the temperature inside the heating furnace to the above processing temperature; introducing a first mixed gas consisting of 50% to 90% ammonia by volume, 0.1% to 0.9% oxygen by volume, and a residual volume consisting of nitrogen into the heating furnace, and maintaining the above processing temperature, so as to form a nitrided layer on the surface of the metal ring; and when the one-third to one-half of the processing time has passed, replacing the atmosphere inside the heating furnace by a second mixed gas consisting of 0% to 25% ammonia by volume and a residual volume consisting of nitrogen, and maintaining the above processing temperature until the remaining processing time passes.